REPORT
SOIL INVESTIGATION
LANDSLIDE AREAS
GUADALUPE RIVER
SAN JOSE, CALIFORNIA
FOR SANTA CLARA VALLEY WATER DISTRICT

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1982

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Cooper
& Clark

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FOR SANTA CLARA VALLEY WATER DISTRICT

Cooper & Clark

CONSULTING ENGINEERS
658 Bair Island Road • Redwood City, California 94063 • Phone (415) 367-9510

October 4, 1982
Our Job No. 170-G

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

Attention: Messrs. Bruce Wilson and Timmy Yung

Gentlemen:

Report
Soil Investigation
Landslide Areas
Guadalupe River
San Jose, California
For Santa Clara Valley Water District

INTRODUCTION

This report presents the results of our soil investigation at three landslide areas along the Guadalupe River in San Jose, California. These slide areas are shown on Plate 1, Vicinity Map. The three slides are all located along the west bank of the river and adjacent to the rear of the houses at 1972, 1644, and 1596 Creek Drive. They are identified respectively as Site Numbers 1, 2 and 3 for ease of presentation in this report.

The purpose of our services was to provide pertinent geotechnical information needed for slope stability analysis by the engineering staff of the Santa Clara Valley Water District, hereinafter called "District". The scope of our services is substantially in accordance with the Contract for Services entered into between The District and Cooper & Clark on September 3, 1982. Our services included review of available information, site reconnaissance, field exploration and laboratory testing.

FIELD EXPLORATION AND LABORATORY TESTING

The subsurface conditions at the three slide sites were investigated by drilling six borings. Boring Nos. 1, 2 and 3 were drilled on Site Number 1 at the locations shown on Plate 2, Site Plan - Site No. 1. Boring Nos. 4 and 5 were drilled on Site Number 2 at the locations shown on Plate 3, Site Plan - Site No. 2. Boring No. 6 was drilled on Site Number 3 at the location shown on Plate 4, Site Plan - Site No. 3. Boring Nos. 1 and 2, drilled by hand augering, encountered refusal at shallow depths. The remainder of the borings were drilled with a portable Minuteman helical auger drill rig. The depths for each of the borings drilled are tabulated below:

Site No.	Boring No.	Depths in Feet
1	1	3 feet
1	2	5½ feet
1	3	19½ feet
2	4	12½ feet
2	5	10 feet
3	6	19½ feet

The field exploration was performed under the technical direction of one of our engineers. The borings were logged and samples were extracted for visual observation and laboratory testing. The log of borings prepared from the field data and subsequent laboratory tests results are presented on Plates 5-A and 5-B, Boring Logs. An explanation of the nomenclature and symbols used on the borings logs is shown on Plate 6, Method of Soil Classification. The boring logs show subsurface conditions on the dates and at the locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations or times.

All of the samples recovered during the field exploration program were visually examined and classified in our laboratory. Laboratory tests were performed on selected soil samples to evaluate the physical properties and engineering characteristics of the subsurface soils at the sites. Moisture content and dry density tests were performed on all of the relatively undisturbed soil samples. In order to evaluate the strength characteristics of the soils, direct shear tests were performed on selected soil samples at natural and artificially increased moisture contents and under various surcharge pressures. One sample was tested for Atterburg limits as an aid in classifying the subsurface soils. The results of these tests are tabulated on the boring logs adjacent to the appropriate sample.

SITE CONDITIONS

SITE NO. 1

Site No. 1 is located behind the Lalond residence at 1972 Creek Drive. The slide, as shown on Plate 2, measures approximately 50 feet in plan dimensions, along Guadalupe River. The top of the bank is approximately 30 feet above the bottom of the creek. The bank initially slopes almost vertically to a depth of approximately 10 feet below the top of the bank and then slopes at an inclination of approximately 1:1 (horizontal to vertical) to the bottom of the creek. It appears that the slope debris at the toe of the slope has been washed or eroded away. The slip plane appears to be exposed at the edge of the top of the bank and at the toe of slope. Boring Nos. 1 and 2 were drilled near the toe of the slope while Boring No. 3 was drilled about 10 feet back from the top of the bank. Stiff to very stiff silty clays were encountered in all three borings drilled at the site except for approximately 2 feet of soft clayey silt which was encountered at the top of Boring 3 located at the top of the bank.

SITE NO. 2

Site No. 2 is located behind the Martin residence at 1644 Creek Drive. The slide, as shown on Plate 3, measures about 80 feet in plan dimension. The top of the bank is approximately 25 feet above the bottom of creek. The bank initially drops vertically to a depth about 5 feet below the top of the bank and then slopes at an inclination of about 1:1 (horizontal to vertical). It appears that some of the slide debris has accumulated near the toe of slope. Boring 4, which was drilled near the toe of the slope, encountered predominantly stiff silty clays except for approximately 3 feet of soft slide debris encountered at the top of the boring and about 2½ feet of soft to medium stiff fine sandy clay located in the apparent slide plane at a depth of about 5½ feet. Boring 5, drilled at the top of the bank, encountered loose to medium dense sandy gravels and clayey sands to a depth of about 9 feet, underlain by stiff silty clays.

SITE NO. 3

Site No. 3 is located behind the Brown residence at 1596 Creek Drive. The slide, as shown on Plate 4, measures approximately 100 feet in plan dimensions. The top of the bank is approximately 20 feet above the creek. The bank slopes near vertically to a depth of about 15 feet below the top of the bank and then slopes at an inclination of approximately 2:1 (horizontal to vertical). Local residents indicated that the retaining wall located near the toe of the slope was overturned some 5 to 6 years ago. This apparently preceded the slide movement and erosion along the bank. The slide plane appears to be exposed at the top and the toe of the slope. Cracking along the top of the bank seems to be related to tension cracks. Boring 6, drilled about 5 feet from edge of the bank, did not encounter any readily identifiable slide planes. The soils encountered in the boring were predominantly stiff to very stiff silty clays except for a layer of medium dense sandy gravel encountered between the depths of about 4½ to 8 feet below the ground surface.

CLOSURE

We trust that the above provides you with the information required at this time. If you have any questions, please contact us.

The following plates are attached and complete this report:

Plate 1	Vicinity Map
Plate 2	Site Plan - Site No. 1
Plate 3	Site Plan - Site No. 2
Plate 4	Site Plan - Site No. 3
Plates 5-A and 5-B	Boring Logs
Plate 6	Method of Soil Classification

Yours very truly,

COOPER & CLARK

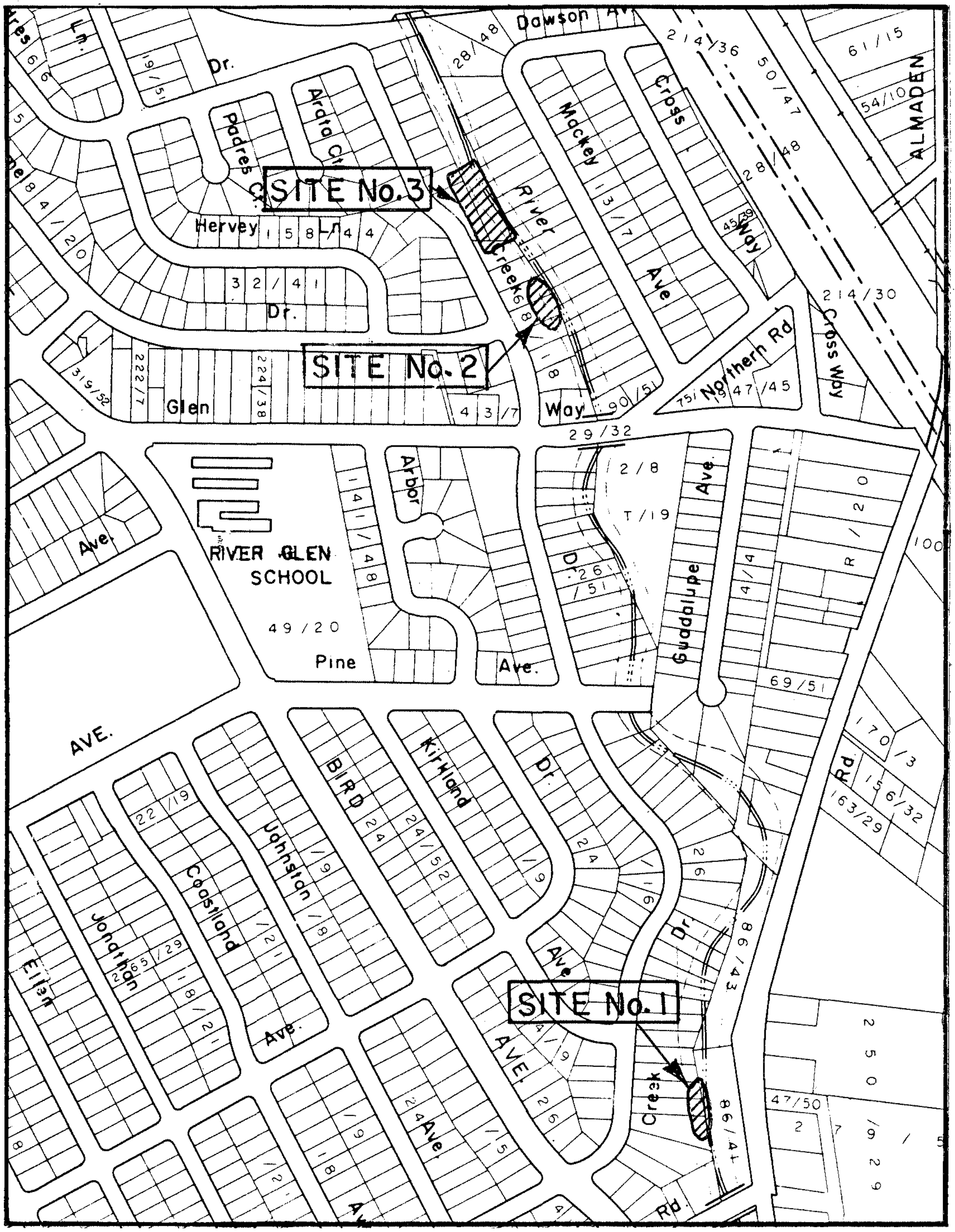
Tom Tejima
TOM TEJIMA
Civil Engineer 21,113

Lynn E. Pera

LYNN E. PERA
Civil Engineer 33,431

TT/LEP/ETL/cal
(6 copies submitted)

PLATE 1



VICINITY MAP

SCALE: 1" = 500'

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By M.B. Date 9/22/82
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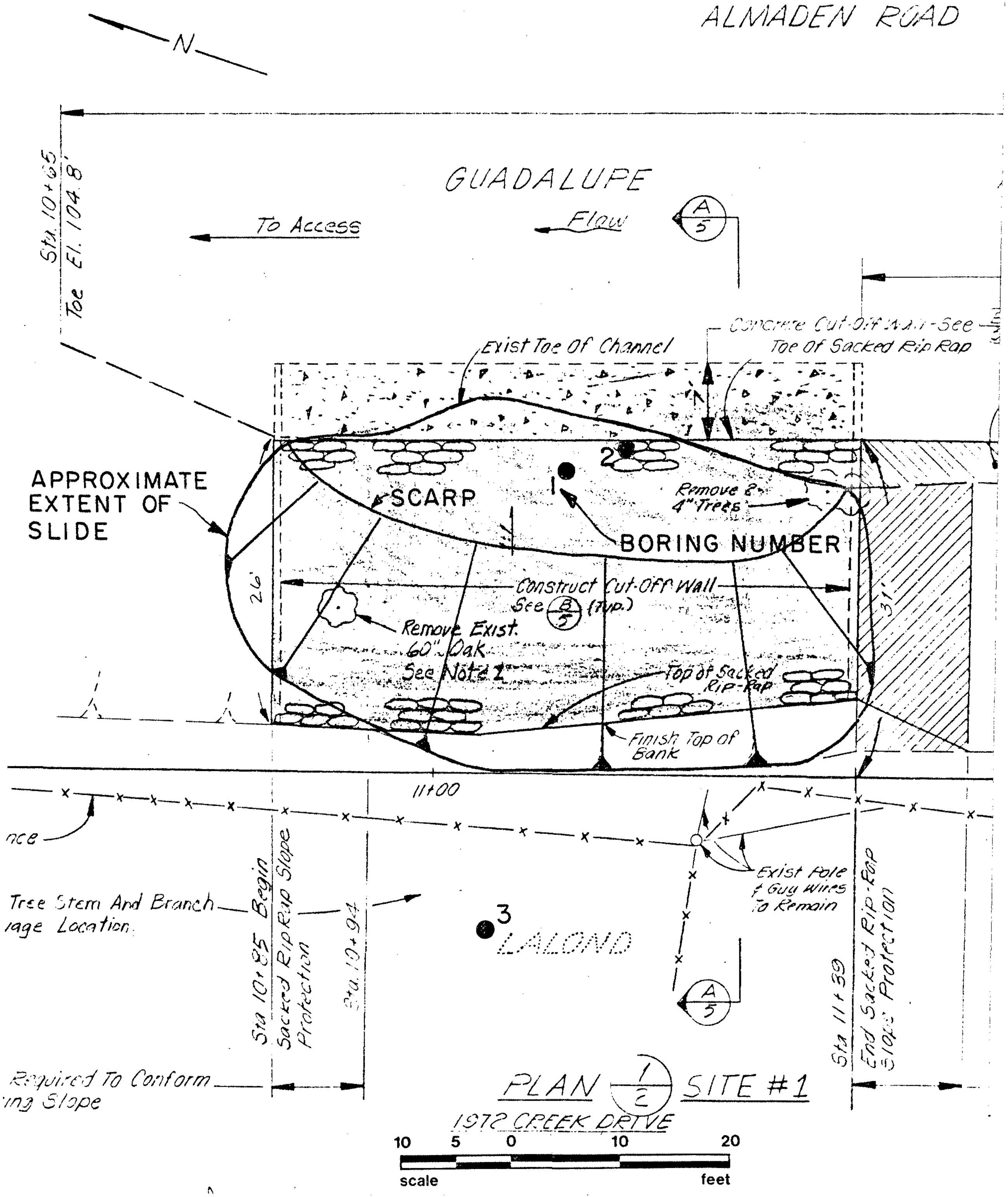
Location SAN JOSE

PLATE 2


ALMADEN ROAD
N
GUADALUPE
To Access
Flow
A
5
Sta. 10+65
Toe El. 104.8'
Concrete Cut-Off Wall - See
Toe Of Sacked Rip Rap
Exist Toe Of Channel
APPROXIMATE EXTENT OF SLIDE
SCARP
2
1
BORING NUMBER
Remove 2 - 4" Trees
26'
31'
Construct Cut-Off Wall See B/5 (Typ.)
Remove Exist. 60" Oak See Note 2
Top of Sacked Rip-Rap
Finish Top of Bank
11+00
nce
Exist Pole & Guy Wires To Remain
Tree Stem And Branch ...age Location
Sta 10+85 Begin Sacked Rip Rap Slope Protection
Sta. 10+94
3
LALONDE
A
5
Sta 11+39
End Sacked Rip-Rap Slope Protection
Required To Conform ...ing Slope
PLAN 1/2 SITE #1
1972 CREEK DRIVE
10
5
0
10
20
scale
feet

NOTE: Extent of slide was sketched in over District drawings from field observations by Cooper & Clark personnel.

SITE PLAN

SITE No. 1

By M.B. Date 9/22/82
Checked By L.P. Date
Job Number 170-G Name Santa Clara Valley Water Dist. Location San José

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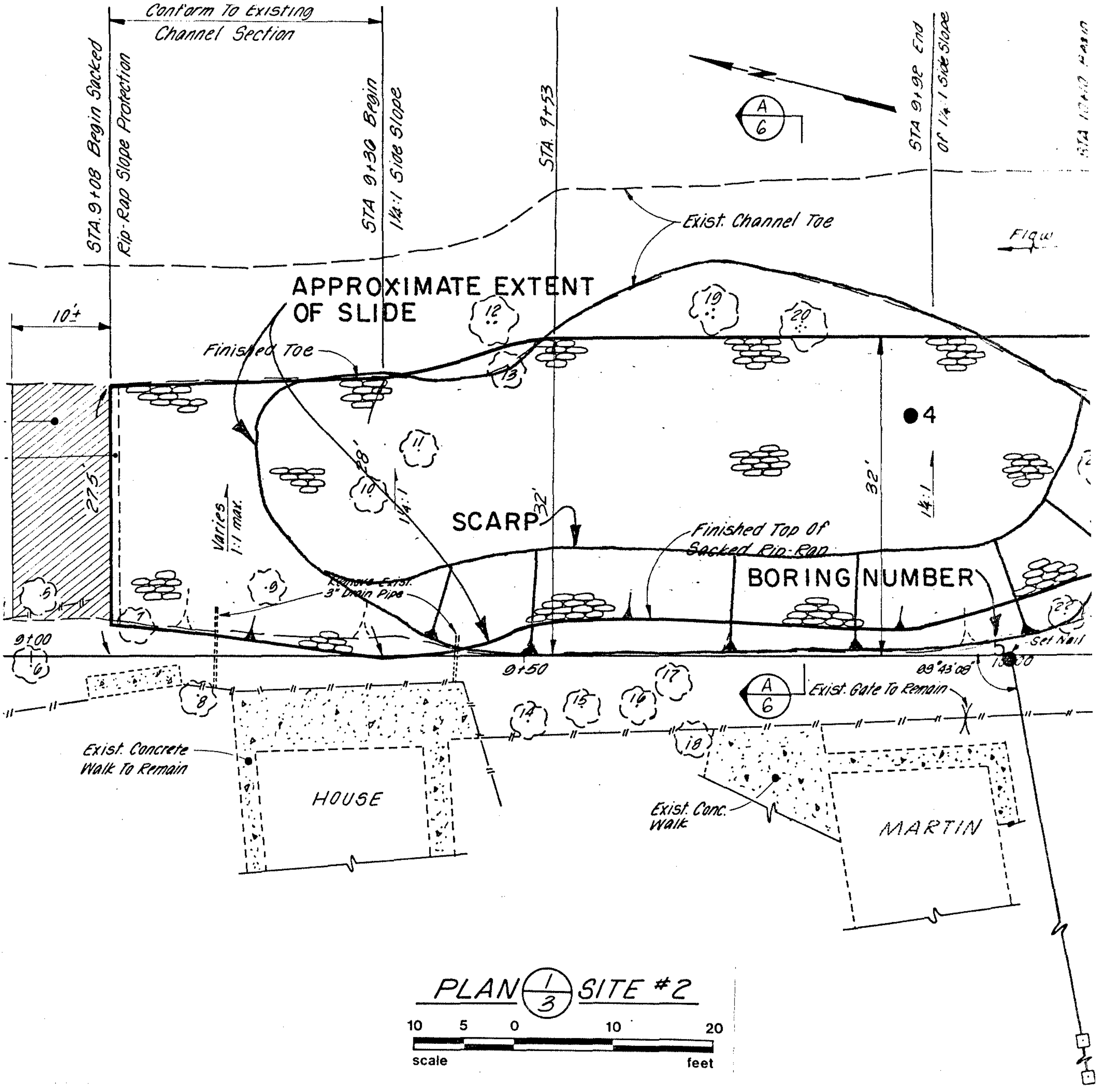
Job Number 170-G Name Santa Clara Valley Water Dist Location San Jose


Conform To Existing Channel Section
STA. 9+08 Begin Sacked Rip-Rap Slope Protection
STA 9+30 Begin 1¼:1 Side Slope
STA. 9+53
STA 9+92 End of 1¼:1 Side Slope
A
6
Exist. Channel Toe
Flow
APPROXIMATE EXTENT OF SLIDE
Finished Toe
10'±
27.5'
Varies 1:1 max.
28'
1¼:1
32'
SCARP
●4
32'
1¼:1
Finished Top Of Sacked Rip-Rap
BORING NUMBER
Remove Exist. 3" Drain Pipe
9+00
9+50
89°43'08"
Set Nail
Exist. Gate To Remain
Exist. Concrete Walk To Remain
HOUSE
Exist. Conc. Walk
MARTIN
1
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
22
PLAN 1/3 SITE #2
10 5 0 10 20
scale feet

NOTE: Extent of slide was sketched in over District drawings from field observations by Cooper & Clark personnel.

SITE PLAN

SITE No. 2

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By________ Date________

By M.B. Date 9/22/82
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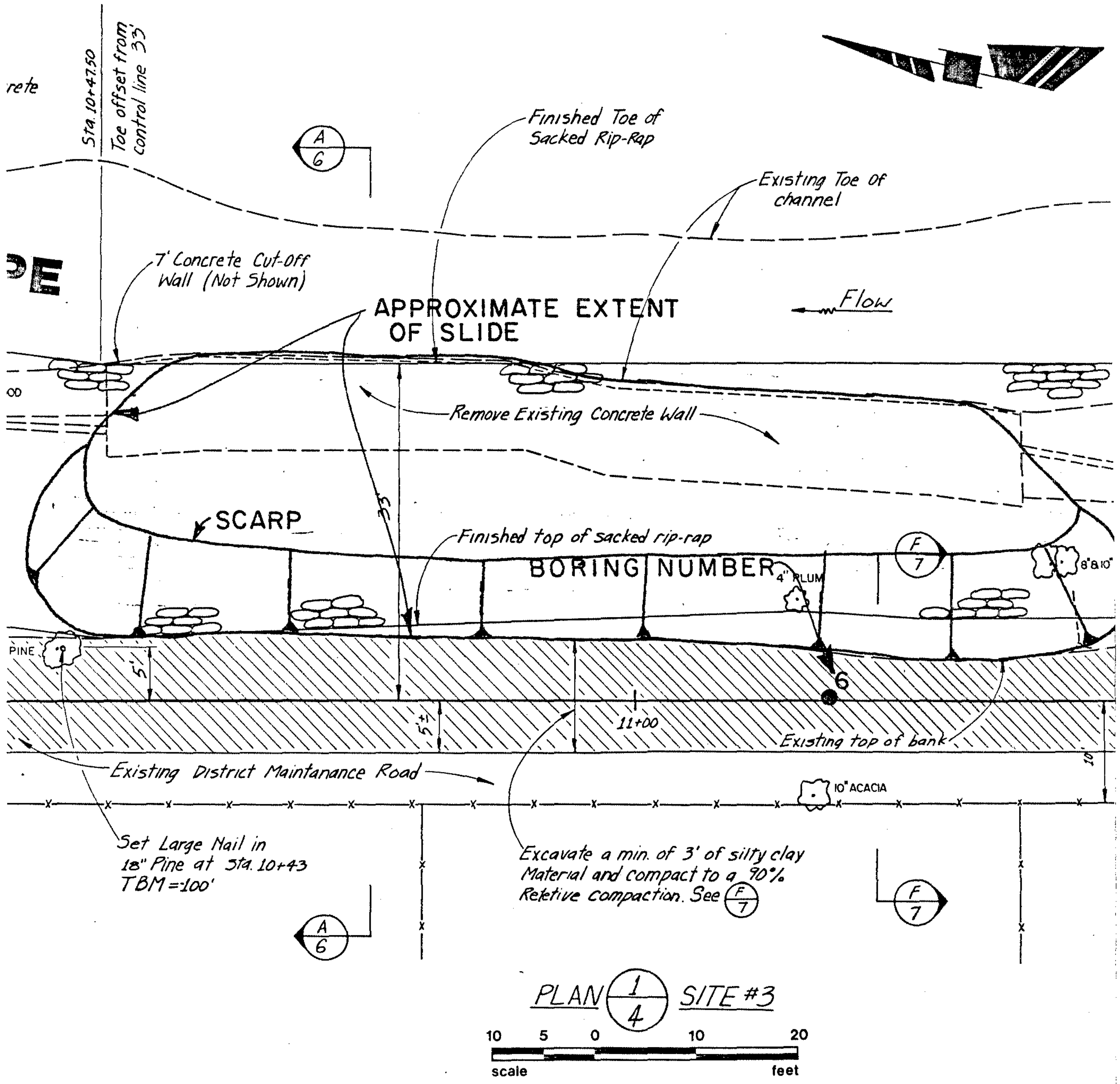
Job Number 170-G Name Santa Clara Valley Water Dist. Location San Jose


rete
Sta. 10+47.50
Toe offset from control line 33'
A/6
Finished Toe of Sacked Rip-Rap
Existing Toe of channel
7' Concrete Cut-Off Wall (Not Shown)
APPROXIMATE EXTENT OF SLIDE
Flow
Remove Existing Concrete Wall
SCARP
33'
Finished top of sacked rip-rap
BORING NUMBER
4" PLUM
F/7
8"&10"
PINE
5'
6
5'±
11+00
Existing top of bank
10'
Existing District Maintanance Road
10" ACACIA
Set Large Nail in 18" Pine at Sta. 10+43 TBM=100'
Excavate a min. of 3' of silty clay Material and compact to a 90% Relative compaction. See F/7
A/6
F/7
PLAN 1/4 SITE #3
10 5 0 10 20
scale feet

NOTE: Extent of slide was sketched in over District drawings from field observations by Cooper & Clark personnel.

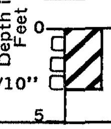
SITE PLAN

SITE No. 3

BORING 1

ELEVATION 105± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
			DSX	150	36	520	25	86	39
			DS	250	Natural	2200	27	90	100
							22	100	100/10"

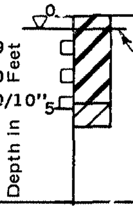


Gray silty clay (CH) (very stiff, dry)
(grading moist)
(grading brownish-gray, hard)

BORING 2

ELEVATION 104± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
							35	88	39
			DSX	400	31	850	31	94	100
			DS	500	Natural	1080	26	100	100/10"

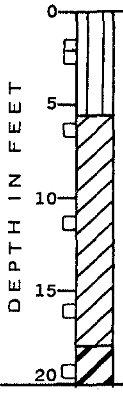


Brownish-gray silty clay (CH) (stiff, very moist)
Encountered water 9/8/82
Grayish-brown silty clay (CL) (stiff, very moist)

BORING 3

ELEVATION 132± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
			DSX	250	42	290	35 11.1	88 72	14
			DS DSX	750 750	Natural 26	1360 600	17 17	89 94	23
			DSX	1350	26	1000	17	103	20
			DSX	2000	24	2000	18	104	15
			DSX	2350	30	2900	27	96	25



Brown clayey silt (ML) (soft, dry)
(grading stiff, moist)
Dark brown very silty clay (CL) (stiff, moist)
(grading brown, very stiff, less silty)
Dark brown silty clay (CH) (stiff, moist)

FIELD NOTES:

1. Borings 1 and 2 were drilled on September 8, 1982 with 4-inch-diameter hand auger equipment and Borings 3 through 6 were drilled on September 15 and 16, 1982 with a portable 3¼-inch-diameter "Minuteman" auger.
2. The following symbol, ☐, denotes an undisturbed sample taken in a 2½-inch-diameter, split-tube barrel driven into the soil by a 30-pound drop weight free-falling approximately 24 inches in Borings 1 and 2 and by a 140-pound drop weight free-falling approximately 30 inches in Borings 3 through 6.
3. The following symbol, ⊡, denotes an attempted undisturbed sample with no recovery or with the sample partially disturbed.
4. Boring elevations were estimated from cross sectionin of the slide areas as proposed by the Santa Clara Valley Water District.
5. The following symbol, ▽, denotes the groundwater level at the time and depth shown on the boring logs.

LABORATORY NOTES AND ABBREVIATIONS:

The tabulated shear strengths are maximum values.

DS = Strain controlled direct shear test at natural moisture contents.

DSX = Strain controlled direct shear test after the sample had been submerged in water until movement ceased under a surcharge equal to the test surcharge.

BORING LOGS

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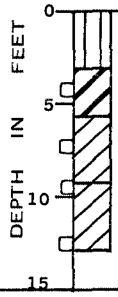
PLATE 5-B

BORING 4

ELEVATION 80± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
			DSX	500	32	1050	24	96	16
	40	15	DSX	900	28	720	26	99	14
			DSX	1100	37	1680	36	82	22
			DSX	1500	29	1350	29	93	21

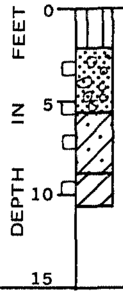


Brown clayey silt (ML)(soft, dry)
(grading grayish-brown, stiff)
Grayish-brown silty clay (CH)(stiff, moist)
Brownish-gray fine sandy clay (CL)(soft, very moist)
(grading medium stiff)
Dark gray silty clay (CL)(stiff, very moist)

BORING 5

ELEVATION 100± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
			DSX DSX DSX	400 1000 600	25 25 26	400 790 450	15	92	13
			DSX	1200	26	940	13	94	11
			DSX DSX	850 2000	23 23	700 1420	8	94	13
			DSX	1200	32	1940	31	89	29

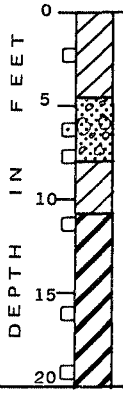


Brown clayey silt (ML)(soft, dry)
(trace gravels)
Brown sandy gravel (GP)(loose, moist)
Brown clayey fine sand (SC)(medium dense, damp)
Grayish-brown very silty clay (CL)(stiff, moist)

BORING 6

ELEVATION 95± FEET

CLASSIFICATION DATA			STRENGTH DATA				MOISTURE-DENSITY DATA		
% FINES (-NO. 200)	LIQUID LIMIT	PLASTICITY INDEX	TYPE OF STRENGTH TEST	TEST SURCHARGE PRESSURE, LBS/SQ FT	TEST MOISTURE CONTENT, %	SHEAR STRENGTH, LBS/SQ FT	NATURAL MOISTURE CONTENT, %	DRY DENSITY, LBS/CU FT	Blows/ft.
			DSX	250	30	700	28	96	16
									16
			DSX	900	48	1150	46	70	12
			DSX	1350	37	1230	36	82	25
			DSX	2000	30	1830	29	92	31
			DS	2350	Natural	2300	39	82	18



Brown very silty clay (CL)(soft, damp)
(grading stiff, moist)
Grayish-brown sandy gravel (GP)(medium dense, dry)
Brownish-gray silty clay (CL)(stiff, moist)
Brownish-gray silty clay (CH)(stiff, moist)
(grading very stiff)
(grading gray)
(grading brownish-gray)

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Job Number 170-G

BORING LOGS

PLATE 6

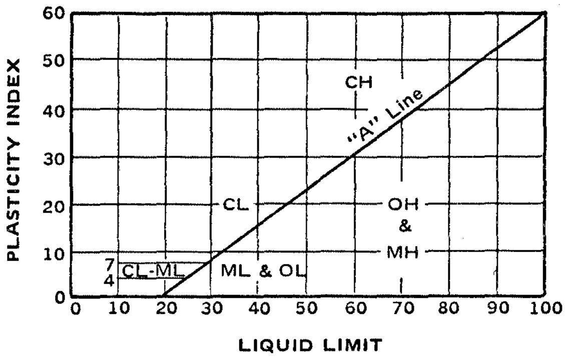
MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than ½ of soil > no. 200 sieve size)	**GRAVELS** (More than ½ of coarse fraction > no. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than ½ of coarse fraction < no. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than ½ of soil < no. 200 sieve size)	**SILTS & CLAYS** LL < 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

CLASSIFICATION CHART

(Unified Soil Classification System)

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse fine	3" to No. 4 3" to ¾" ¾" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

GRAIN SIZE CHART



PLASTICITY CHART

METHOD OF SOIL CLASSIFICATION

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By______ Date______

By______ Date______
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Job Number 170-G Name Santa Clara Valley Water Dist. Location San Jose, California